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09/806,323	07/20/2001	Mel Slater	08364.0007	6776

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FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER  
LLP  
901 NEW YORK AVENUE, NW  
WASHINGTON, DC 20001-4413

EXAMINER

GEBRESILASSIE, KIBROM K

ART UNIT PAPER NUMBER

2128

DATE MAILED: 01/18/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 09/806,323	<b>Applicant(s)</b> SLATER, MEL	
	<b>Examiner</b> Kibrom K. Gebresilassie	<b>Art Unit</b> 2128	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 02 November 2005.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 114-173 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 114-173 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

#### DETAILED ACTION

1. Claims 114-173 have been presented for examination based on applicant's amendment filed on 02 November 2005.
2. Claims 58-113 have been cancelled.
3. New Claims 114-173 has been added.
4. Claims 114-173 remain rejected by examiner.

#### ***Response to Arguments***

5. Applicants arguments filed on 02 November 2005 have been fully considered.

Regarding applicant's response Objection to Claims: The examiner withdraws objection to the claims in view of applicant's amendments to the New Claims filed on 02 November 2005.

Regarding applicant's response to the specification: The examiner withdraws objection to specification in view of applicant's amendment to the specification and submitted a copy of clean Abstract filed on 02 November 2005.

Regarding applicant's response to 101 rejection: The examiner withdraws the 101 rejection in view of applicant's amendment and argument filed on 02 November 2005.

Regarding applicant's response to 102(b) rejection:

Regarding Newly Added Independent Claims 114, 127, and 137: Applicant's argued that the limitation "...a second definer operable to define a **plurality of predetermined discrete energy propagation pathways**... which pathways are independent of any ...objects or energy sources..." does not teach

by Wallace. However, the examiner notes that the new claim limitation that recites "...a second definer operable to define a plurality of predetermined discrete energy propagation pathways... which pathways are independent of any ...objects or energy sources..." is clearly taught by Wallace on col. 6 lines 45-58 which reads as follows:

"A significant advantage flowing from the practice of the present invention is the ability to define light sources in radiosity that have artificial (and arbitrary) characteristics. For example, so called "non-physical" light sources with no attenuation over distance or light having arbitrary quadratic attenuation can be simulated. Further, light sources such as "point lights" (i.e., a light emitter that has no area) and "positional lights" (e.g., spot lights and cone lights) having artificial light distribution patterns, as well as so called "directional lights" (i.e., parallel light rays located an infinite distance from the scene) can be simulated in radiosity. In the practice of the invention, these features are achieved by redefining the form factor equation for the desired effect."

The examiner has therefore interpreted claimed invention "...plurality of predetermined discrete energy propagation pathways..." to be functionally equivalent to the "having artificial light distribution patterns, as well as so called "directional lights"" as taught by Wallace.

The examiner therefore maintains the 102(b) rejection of claims 114, 127, and 137. Furthermore, the same rejection applies to newly added independent claims 142, 154, and 164.

Regarding applicant's response to 103(a) rejection:

Regarding 103(a) rejection motivation to combine: The examiner contends that the motivation to combine Wallace and Wrigley and in accordance with MPEP guidelines for the following reasons:

MPEP 2143.01 Suggestion or Motivation To Modify References first recites:

*"There are three possible sources for a motivation to combine references: the nature of the problem to be solved, the teachings of the prior art, and the knowledge of persons of ordinary skill in the art." In re Rouffet, 149 F.3d 1350, 1357, 47 USPQ2d 1453, 1457-58 (Fed. Cir. 1998)"*

Therefore, in suggesting a motivation to combine, the examiner specifically focused his motivation on the knowledge of persons of ordinary skill in the art. More specifically, that a skilled artisan would have made an effort to become aware of what capabilities had been developed in the market place, and hence would have knowingly modified Wallace with the teachings of Wrigley.

MPEP 2144 Sources of Rationale Supporting a Rejection Under 35 U.S.C. 103 recites:

*The rationale to modify or combine the prior art does not have to be expressly stated in the prior art; the rationale may be expressly or impliedly contained in the prior art or it may be reasoned from knowledge generally available to one of ordinary skill in the art, established scientific principles, or legal precedent established by prior case law. In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); In re Jones, 958 F.2d 347, 21 USPQ2d 1941*

*(Fed. Cir. 1992). See also In re Kotzab, 217 F.3d 1365, 1370, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000) (setting forth test for implicit teachings); In re Eli Lilly & Co., 902 F.2d 943, 14 USPQ2d 1741 (Fed. Cir. 1990) (discussion of reliance on legal precedent); In re Nilssen, 851 F.2d 1401, 1403, 7 USPQ2d 1500, 1502 (Fed. Cir. 1988) (references do not have to explicitly suggest combining teachings);*

*Having access to the teachings of Wallace and Wrigley, would have looked to the prior art and hence would have knowingly modified the teaching of Wallace, with the teachings of Wrigley in order to gain the advantage of reduced cost and development time. Specifically, a skilled artisan working in this obviously competitive environment would have made an effort to become aware of what capabilities had already been developed in the market place, and hence would have been aware of, and known to seek out the relative teachings of the problem to be solved, namely, the teaching of Wallace and Wrigley.*

*For the reasons set forth above the examiner maintains the 102(b) and 103(a) rejections.*

### ***Claim Rejections - 35 USC § 102***

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 114-120, 126-130, 135-148, 153-157, and 162-173 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,313,568 issued to Wallace.

**As per New Claim 114:**

Wallace discloses computer apparatus operable to process data to model energy propagation within a three dimensional scene (col. 1 lines 20-23), the apparatus comprising:

a first definer operable to define a three dimensional environment for containing the three dimensional scene (Abstract lines 1-6);

a second definer operable to define a plurality of predetermined discrete energy propagation pathways in a plurality of directions within the defined three dimensional environment, which pathways are independent of any defined energy receiver, object or energy source (col. 6 lines 45-58);

a creator operable to create the three dimensional scene within the three dimensional environment by locating objects and energy sources within said three dimensional environment (Abstract lines 1-6);

a determiner operable to determine intersections between said predetermined pathways and said objects and energy sources within said three dimensional environment (col. 1 lines 61-67);

a first calculator operable to calculate propagation of energy along said predetermined pathways in accordance with said objects and energy sources and the intersections determined by said determiner (col. 1 lines 63-67);

a third definer operable to define an energy receiver within said three dimensional environment (col. 7 lines 8-14);

an identifier operable to identify which of said predetermined pathways intersect said energy receiver (col. 5 lines 57-63); and

a second calculator operable to calculate energy received by said energy receiver within said three dimensional environment in accordance with the calculated energy propagation along the identified predetermined pathways which intersect said energy receiver (col. 2 lines 6-12).

**As per New Claim 115:**

Wallace discloses second calculator is operable to calculate an energy magnitude value (col. 8 lines 50-52) based on energy received (col. 3 lines 64) by the energy receiver (col. 7 lines 8-13).

**As per New Claim 116:**

Wallace discloses third definer is operable to locate a viewing plane (col. 2 line 2) within said three dimensional environment (col. 1 lines 20-23).

**As per New Claim 117:**

Wallace discloses second calculator is operable to determine, for each identified pathway that intersects said viewing plane (col. 2 lines 1-5), an angle of incidence of the pathway with said viewing plane, and to generate image data in accordance with the determined angles of incidence (Fig. 5).

**As per New Claim 118:**



Wallace discloses second definer is operable to define a plurality of subsets of pathways (col. 7 lines 1-7; Fig. 1 element H), the pathways of each subset being parallel to each other and having a different orientation to the pathways of the other subsets (Fig. 1 element PI and H).

**As per New Claim 119:**

Wallace discloses second definer is operable to define said subsets such that each subset of pathways includes parallel pathways arranged in a rectangular array (Fig. 2 element H).

**As per New Claim 120:**

Wallace discloses second definer includes an indexer operable to index subsets of pathways in accordance with the direction of the pathways of each subset (Fig. 1 elements R1-R7).

**As per New Claim 126:**

Wallace discloses first calculator is operable to process energy propagation information for a pathway with an intersection with an object, to identify one or more pathways onto which energy is to be propagated from said intersection pathway, and to generate energy propagation information for said identified pathway or pathways (col. 3 lines 44-54).

**As per New Claim 127:**

Wallace discloses apparatus for generating data representing a three dimensional scene, the apparatus comprising;

a first definer operable to define a three dimensional environment for containing the three dimensional scene within which energy propagation is to be represented (Abstract lines 1-6);

a second definer operable to define a plurality of predetermined discrete energy propagation pathways in a plurality of directions within the defined three dimensional environment, which pathways are independent of any defined viewpoint, object or energy source (col. 6 lines 45-58);

a creator operable to create the three dimensional scene within the three dimensional environment by locating objects and energy sources within said three dimensional environment (col. 5 lines 57-63);

a determiner operable to determine intersections between said predetermined pathways and said objects and energy sources within said three dimensional environment (col. 1 lines 61-67); and

a data store operable to store data representative of said three dimensional scene, including data identifying said determined intersections (col. 2 lines 26-40).

**As per New Claim 128, 138, 146, and 155:**

The limitations of claims 128, 138, 146, and 155 have already been discussed in the rejection of claim 118. They are therefore rejected under the same rationale.

**As per New Claim 129,147, and 156:**

The limitations of claims 129, 147, and 156 have already been discussed in the rejection of claim 119. They are therefore rejected under the same rationale.

**As per New Claim 130, 148, and 157:**

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The limitations of claims 130, 148, and 157 have already been discussed in the rejection of claim 120. They are therefore rejected under the same rationale.

**As per New Claim 135:**

Wallace discloses calculator operable to calculate data defining propagation of energy along said predetermined pathways in accordance with said objects and energy sources and the intersections determined by said determiner (col. 1 lines 63-67) and wherein the determiner is operable to store, for each determined intersection, information defining energy propagation at that intersection (col. 2 lines 26-40).

**As per New Claim 136, 153, and 163:**

The limitations of claims 136, 153, and 163 have already been discussed in the rejection of claim 126. They are therefore rejected under the same rationale.

**As per New Claim 137:**

Wallace discloses apparatus for analyzing energy propagation within a three dimensional scene, comprising;

a first receiver operable to receive data defining a three dimensional environment for containing the three dimensional scene (col. 5 lines 57-63);

a second receiver operable to receive data defining a plurality of predetermined discrete energy propagation pathways in a plurality of directions within the defined three dimensional environment, which pathways are independent of any defined energy receiver, object or energy source (col. 6 lines 45-58);

a third receiver operable to receive data defining the three dimensional scene within the three dimensional environment by locating objects and energy sources within the three dimensional environment (col. 5 lines 57-68);

a fourth receiver operable to receive data identifying intersections between said pathways and said objects and said energy sources within said three dimensional environment (col. 1 lines 61-67);

a fifth receiver operable to receive data defining propagation of energy along said pathways (col. 6 lines 45-58);

a definer operable to define an energy receiver within said three dimensional environment (col. 7 lines 8-14);

an identifier operable to identify which of said predetermined pathways intersect said energy receiver (col. 5 lines 57-63); and

a calculator operable to calculate energy received by said energy receiver in accordance with the energy propagated along the identified predetermined pathways which intersect said energy receiver (col. 2 lines 6-12).

**As per New Claim 139, 143, and 166:**

The limitations of claims 139, 143, and 166 have already been discussed in the rejection of claim 115. They are therefore rejected under the same rationale.

**As per New Claim 140, 144, and 167:**

The limitations of claims 140, 144, and 167 have already been discussed in the rejection of claim 116. They are therefore rejected under the same rationale.

**As per New Claim 141, 145, and 168:**

The limitations of claims 141, 145, 168 have already been discussed in the rejection of claim 117. They are therefore rejected under the same rationale.

**As per New Claim 142:**

The limitation of claim 142 has already been discussed in the rejection of claim 114. It is therefore rejected under the same rationale.

**As per New Claim 154:**

The limitation of claim 154 has already been discussed in the rejection of claim 127. It is therefore rejected under the same rationale.

**As per New Claim 162:**

Wallace discloses calculating data defining propagation of energy along said predetermined pathways in accordance with said objects and energy sources and the intersections determined in said determining (col. 1 lines 61-67) step and wherein said determining step stores, for each determined intersection, information defining energy propagation at the intersection (col. 1 lines 63-65).

**As per New Claim 164:**

The limitation of claim 164 has already been discussed in the rejection of claim 137. It is therefore rejected under the same rationale.

**As per New Claim 165:**

Wallace discloses receiving data defining said plurality of predetermined discrete energy propagation pathways is operable to receive data defining a plurality of subsets of pathways (col. 7 lines 1-7; Fig. 1 element H), the pathways of each subset being

parallel to each other and having a different orientation to the pathways of other subsets (Fig. 1 element PI and H).

**As per New Claim 169:**

Wallace discloses generating a signal conveying image data generated by said image data generating step (col. 5 lines 29-33); and  
recording the signal either directly or indirectly (col. 2 lines 26-40).

**As per New Claim 170:**

Wallace discloses generating a signal conveying information defining said pathways, intersections of said pathways and propagation of energy along said pathways (col. 5 lines 25-29); and  
recording the signal either directly or indirectly (col. 2 lines 26-40).

**As per New Claim 171:**

The limitation of claim 171 has already been discussed in the rejection of claim 114. It is therefore rejected under the same rationale.

**As per New Claim 172:**

The limitation of claim 172 has already been discussed in the rejection of claim 127. It is therefore rejected under the same rationale.

**As per New Claim 173:**

The limitation of claim 173 has already been discussed in the rejection of claim 137. It is therefore rejected under the same rationale.

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 121-125, 131-134, 149-152, and 158-161 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,313,568 issued to Wallace as applied to the rejection of claims 114-120, 126-130, 135-148, 153-157, and 162-173 above in view of European Application No. 95938509.7 (International Application No. PCT/GB95/02798) issued to Wrigley.

**As per New Claim 121:**

Wallace discloses a reference plane (Fig. 3 element P).

Wallace fails to disclose spherical coordinates.

Wrigley discloses Apparatus in accordance with claim 120, wherein the indexer is operable to index subsets in accordance with spherical coordinates relative to a reference plane (page 6 lines 3-4; Fig. 5).

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to combine the teachings of Wallace related to a global illumination technique for generating three dimensional computer graphics employing ray tracing to compute form factor in radiosity with the teachings of Wrigley related to a method and apparatus for constructing an image of a notional scene. The motivation for doing so would have been more convenient to determine if a straight line path intersects a

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surface of the object or a zone of illumination and for each intersecting path determining the co-ordinates of the intersection nearest the viewing position and storing all intersections (page 2 lines 38-40). Hence a skilled artisan having access to the teaching of Wallace and Wrigley would have knowingly modified the teaching of Wallace with Wrigley.

**As per New Claim 122:**

Wallace discloses Apparatus in accordance with claim 121, wherein the second definer is operable to define a larger number of pathways in directions at smaller angles to the reference plane than are defined in directions at larger angles to the reference plane (Fig. 4), such that the distribution of pathway directions within the three dimensional environment is substantially uniform (Fig. 3 element P).

**As per New Claim 123:**

Wallace discloses apparatus in accordance with claim 122, wherein the second definer is operable to define pathways such that the number of pathways defined in directions at a particular angle to the reference plane is substantially proportional to the complement of said perpendicular angle (Fig. 6).

**As per New Claim 124:**

Wrigley discloses Apparatus in accordance with claim 1 14, wherein the determiner is operable to store, for each determined intersection, information relating to the identity of the associated pathway and the object that the pathway intersects (page 6 lines 44-45).

**As per New Claim 125:**



Wallace discloses apparatus in accordance with claim 124, wherein the determiner is operable to store, for each determined intersection, information defining energy propagation at that intersection (col. 1 lines 63-65).

**As per New Claim 131, 149, and 158:**

The limitations of claims 131, 149, and 158 have already been discussed in the rejection of claim 121. They are therefore rejected under the same rationale.

**As per New Claim 132, 150, and 159:**

The limitations of claims 132, 150, and 159 have already been discussed in the rejection of claim 122. They are therefore rejected under the same rationale.

**As per New Claim 133, 151, and 160:**

The limitations of claims 133, 151, and 160 have already been discussed in the rejection of claim 123. They are therefore rejected under the same rationale.

**As per New Claim 134, 152, and 161:**

The limitations of claims 134, 152, and 161 have already been discussed in the rejection of claim 124. They are therefore rejected under the same rationale.

***Conclusion***

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

*U.S. Patent No. 5,729,672 issued to Ashton et al.*

*U.S. Patent No. 5,488,700 issued to Glassner et al.*

11. Any inquiring concerning this communication or earlier communication from the examiner should be directed to Kibrom K. Gebresilassie whose telephone number is

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(571) 272-8571. The examiner can normally be reached on Monday-Friday, 8:30 am to 4:30 pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner supervisor, Kamini shah can be reached at (571) 272-2279. The official fax number is (571) 273-8300. Any inquiring of a general nature relating to the status of this application should be directed to the group receptionist whose telephone number is (571) 272-3700.

**Kibrom K. Gebresilassie**

Patent Examiner  
U.S. Patent and Trademark Office  
Simulation and Emulation, Art Unit 2128  
401 Dulany St., Room 5C25 (Randolph)  
Alexandria, VA 22314-5774  
Tel: 571-272-8571  
Kibrom.gebresilassie@uspto.gov

  
**KAMINI SHAH**  
**SUPERVISORY PATENT EXAMINER**